Environment Canada
Environmental Conservation Service

Environnement Canada
du Service de la Conservation d l'environnement

Inland Waters Directorate
Western and Northern Region

Direction générale des eaux intérieures
Région de l'Ouest et du Nord

MANITOBA-NORTHWESTERN ONTARIO DISTRICT

CONSTRUCTION, UPGRADING & MAINTENANCE

1984-1985 ANNUAL REPORT

REPORTED BY:

J.D. KENNING

CONSTRUCTION ENGINEER

R.E. COTE

CONSTRUCTION SUPERVISOR

Prepared for:

D.R. Kimmett, P. Eng.
Regional Chief
Water Resources Branch
Winnipeg, Manitoba
April, 1985

DEPARTMENT OF THE ENVIRONMENT

INLAND WATERS DIRECTORATE

WATER RESOURCES BRANCH

ANNUAL CONSTRUCTION REPORT

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89-05711/

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1.0 INTRODUCTION

The Manitoba - N.W. Ontario District of the Water Resources Branch of Environment Canada carries out construction projects under formal agreements with the Province of Manitoba, the Province of Ontario and through arrangements with other agencies.

This report contains a brief description of each project, a cost breakout and cost summary for the 84-85 construction program. A description of construction methods and procedures, and a listing of salvaged materials are contained in the appendices.

Construction projects are separated into three categories:

(i) Construction - installation of structures at a new hydrometric station.

(ii) Upgrading - generally the erection of new structures at an existing hydrometric station for the purpose of improving the quality of data.

(iii) Maintenance - repairs to existing structures, including dismantling of gauging structures and returning the site to its original condition.

The projects are constructed mainly by Winnipeg construction Section staff, with some assistance from Hydrometric Surveys staff. Contractors are used for specialized services, such as excavating, hauling, providing redi-mix concrete and other tasks. All construction is carried out with due attention being given to "Minimum Standards for Design, Construction and Maintenance" developed for the District.

In addition to the construction, upgrading and maintenance of the structures at hydrometric gauging stations, the Water Resources Branch also installs the equipment and instruments required at the gauging stations. This work is normally carried out by the hydrometric staff of Water Survey. Their activities related to the installation of instrumentation and real time telemetry equipment are noted in Section 5.0 of this report.

An Environmental Assessment of all Construction projects in 84-85 was completed. The criteria for, and results of, this assessment are noted in section 3.5 of this report.

2.0 COST-SHARING ARRANGEMENTS

The cost-sharing arrangements between Canada and the Provincial agencies are governed by a Memorandum of Agreement for hydrometric surveys. Under the terms of these Agreements, each gauging station is classified Federal, Federal-Provincial or Provincial by a Coordinating Committee and formalized as Schedule A to the Agreements.

Determination of the construction program is a joint consultative process with the Province that results in a program which is a blend of both Federal and Provincial government priorities. Priority changes during the year, are reviewed with the Province.

Costs for maintenance, upgrading or new construction are shared in accordance with Schedule A to the Agreements. Stations classified as Federal are the cost responsibility of the Water Resources Branch of Canada (CWRB), stations classified as Federal-Provincial are cost shared equally and stations classified as Provincial are the cost responsibility of the Province.

Costs chargeable to the construction program are defined in the Memorandum of Agreement under Schedule B to the Agreement. In summary, direct costs, such as, salaries of construction personnel, field travel expenses, vehicle costs, construction materials, contract payments for services and depreciation of construction equipment are chargeable.

Specialized equipment and/or instrumentation, such as real time telemetry equipment, is paid for by the party or parties requesting the service irrespective of the hydrometric station's cost share classification. Under the Agreement the cost of the basic water level recorder is the responsibility of the Water Resources Branch of Canada and therefore are not cost shared. Commencing in 1983-84, the cost of servomanometers is shared according to the station designation.

Appendix B of this report is for the record keeping of salvaged material from discontinued stations. This aids in the life cycle management of our construction items having significant value. The procedure for the identification, storage and re-use is described in Appendix B.

Construction carried out for other agencies is generally covered in a Memorandum of Understanding (MOU), where the formalized agreement specifies the financial responsibility for the Construction costs.

2,1 COST SUMMARY

MANITOBA

Federal Costs

Construction Program	$46,223.14
Recorders and Servomanometers	50,750.00
Real Time Telemetry	81,200.00
TOTAL	$178,173.14

Provincial Costs

Construction Program	$24,881.93
Servomanometers	1,950.00
TOTAL	$26,831.93

ONTARIO

Federal Costs

Construction Program	$13,626.06
Recorders and Servomanometers	16,300.00
Real Time Telemetry	17,500.00
TOTAL	$47,426.06

Other Agency

A. L.W.C.B.

Recorders and Servomanometers	$18,300.00
Real Time Telemetry	22,300.00
TOTAL	$40,600.00

B. A.E.C.L.

Construction Program	$32,883.80
Recorders and Servomanometers	12,200.00
Real-Time Telemetry	17,000.00
TOTAL	$62,083.80

TOTAL DISTRICT CAPITAL CONSTRUCTION PROGRAM	$355,114.93

3.0 CONSTRUCTION PROGRAM 1984-85

Phase II of the Districts long term construction program, which began in 1982-83 and consisted of upgrading look-in to walk-in type shelters and the insulation and electrification of stations, was again curtailed during 1984-85. Upgrading look-in to walk-in type shelters was reduced to two while insulation and electrification were further reduced to seven locations each.

Fifty-nine projects were completed during the year. Six new stations were established, seventeen were upgraded and thirty-six more required maintenance of various nature. The total cost for the District Construction Program was $117,635 (excluding instrumentation).

Of the six stations requiring new construction, one was on Lac Seul and constructed for the Lake of the Woods Control Board, one was re-established at an old location, and four were commenced for Atomic Energy of Canada Limited near Atikokan, Ontario.

Station upgrading consisted of converting two look-ins to walk-in shelters, insulating seven walk in shelters, electrifying seven shelters, constructing one cableway and extending telephone service to one location.

Station maintenance consisted mainly of repairing of functional wells, electrical repairs, repairing cableways, and dismantling gauging structures.

The 84-85 construction program was completed under the direction of the Construction Engineer, and the Construction Supervisor with assistance from two summer students, and Water Survey Division field surveys staff.

3.1 CONSTRUCTION PROGRAM COST SUMMARY

Manitoba Stations

	Federal	Fed.-Prov.	Provincial	Total
New Construction		2,138.27		2,138.27
Upgrading	8,302.14	25,750.92	2,371.06	36,424.12
Maintenance	21,396.18	5,170.44	5,996.06	32,562.68
Total	$29,698.32	$33,059.63	$8,367.12	$71,125.07

Ontario Stations

	Federal	A.E.C.L.	Total
New Construction	5,738.85	32,883.80	38,622.65
Upgrading	7,485.07		7,485.07
Maintenance	402.14		402.14
Total	$13,626.06	$32,883.80	$46,509.86

TOTAL CONSTRUCTION PROGRAM $117,634.93

3.2 AVERAGE COSTS FOR 1984-85

Cableway

A 350' span cable consisting of 3/4" 6 x 19 wire rope complete with 14' high steel pipe A-frames with concrete anchors, aluminum sit-down cable car, platform and aircraft warning markers.

Materials		$6,500.00
Travel Expenses		750.00
Salaries		2,300.00
	Total	$9,550.00

Servomanometer Shelters

Armco - 5'-4" square x 8'-0" high, insulated and panelled, set on concrete or timber base.

Materials		$1,650.00
Travel Expenses		325.00
Salaries		1,050.00
	Total	$3,025.00

Functional Installation

A 16' long, 15" diameter CSP well with "California" type shelter generally strapped to bridge pile or peir.

Materials		$ 440.00
Travel Expenses		145.00
Salaries		490.00
	Total	$1,075.00

Instrumentation

Servomanometer	$3,900.00
A 71 Stevens Recorder	2,200.00
Telemark (with line coupler)	3,300.00
Wire Weight Gauge	780.00
DCP System	8,800.00

3.3 DEFINITIONS FOR STATION COST BREAKDOWN

Construction cost data is divided into eleven groups and is described briefly as:

Materials and Supplies	All materials supplied by Water Resources Branch for erection of specified structure.
Travel Expenses	Air fare (scheduled flights), meals, accommodation. Gas and oil used by construction vehicles.
Salaries	Wages of Water Resources Branch personnel.
Labour	Wages paid to other than Water Resources Branch personnel.
Rentals	Charges for rental of equipment used by Water Resources Branch personnel.
Contract Cost	Payment to a private contractor for supply of a service or completion of a construction project (includes cost of materials supplied by conctractor).
Aircraft Charter	Use of non-scheduled aircraft flights.

Electrical	Wiring of shelter for power.
Hydro	Extension of electrical service to gauge shelter (Manitoba Hydro or Ontario Hydro).
Telephone	Extension of private line telephone service to gauge shelter.
Instrumentation	Servomanometer, type A recorder, telemarks and code-a-phone adapters, DCP's (not included in project costs, but included on cost summary Sections 5.1 and 2.1).

3.4 CONSTRUCTION COST COMPARISON 1971/72 - 84/85

AVERAGE INSTALLATION COST OF TYPICAL STRUCTURES

Fiscal	Bank		Servo-Shelter			Instrumentation	
Year	Installation	Cableway	Bally	Armco	Functional	A71	Servo
71-72	3711	3100	-	664	320		
72-73	4300	3300	-	700	370		
73-74	4817	3550	-	800	460		
74-75	6257	4000	-	995	510		
75-76	6809	5636	-	958	507		
76-77	7505	6100	3055	1232	595		
77-78*	3051	4243	3363	1943	617		
78-79	4206	-	3834	2335	690		
79-80	-		3958	2175	687	1925	2452
80-81	-	-	3553	2498	713	1833	2820
81-82	-	5500	4283	2389	918	2055	3131
82-83	9854	9137	4950	2580	954	2200	3800
83-84	-	9062		2797	1018	2200	3600
84-85	-	9550	-	3025	1075	2200	2900

Note * Commencing in 1977, all work performed by the Construction Staff and all shelters are insulated and panelled.

3.5 Environmental Assessment

In 1984 the District began formal environmental assessment following "The Environmental Assessment and Review Procedure for Inland Waters Directorate, Western and Northern Region, Work Plan Activities" which implements the Department of Environment's "Guideline on Procedures for Environmental Screening of Departmental Projects".

The purpose of the process is to ensure that the environmental effects of federal projects are assessed in relation to possible adverse effects upon the Environment. Thirteen criteria,

1. Clearing
2. Top soil removal
3. Culverting
4. Channel dredging
5. Weir construction
6. Rip rap placement
7. Herbicide usage
8. Stream in fill
9. Chemical preservatives
10. Bank excavation
11. Permafrost disturbance
12. Drainage
13. Drilling and blasting

were specificed as being conditions where environmental assessment was required.

The following prescreening form lists those locations on the 84-85 Construction program where one or more of these criteria existed. It also notes the areas of potential impact of project and what mitigative measures and consultations took place before project initiation.

Only nine projects had the potential of an environmental inpact. The Ontario Ministry of Natural Resources reviewed the plans for four projects and after requesting changes to two of them, granted permits.

PRESCREENING FORM

Inland Waters Directorate
Western & Northern Region

Branch / District WATER RESOURCES/WINNIPEG

Responsibility Centre Manager _____

Fiscal Year 84-85

PROJECT DETAILS						CONCLUSION		
Location		Type of Work (a)	Components	Schedule		Potential Impact Area (b)	Mitigative Measures (c)	Consultation
River/Lake	latitude/longitude			Start	Finish			
OVERFLOWING RIVER	59° 09' 15"/ 101° 06' 30"	2	10	Sep. 10	Sep. 14	3		
SNOWFLAKE CREEK	49° 01' 17"/ 98° 36' 13"	2	6	Jul 23	Aug 8	4		
MOWBRAY CREEK	49° 00' 00"/ 98° 26' 15"	2	6, 4	Jul 17	Jul 18	4		
ASSINIBOINE RIVER	50° 06' 39"/ 101° 92' 97"	3	1	Oct 10	Dec 7	3		
LAC SEUL								
HS4 - ATIKOKAN	48° 53' 45"/ 91° 40' 00"	3	1	Oct 31	Dec 31	3		MINISTRY OF NATURAL RESOURCES - ONTARIO
HS5 - ATIKOKAN	48° 55' 25"/ 91° 39' 35"	3	4, 5	Oct 22	Dec 7	1, 3	2	
N. TRIB TO DASHWA LAKE	48° 56' 25"/ 91° 48' 40"	3	4, 5	Oct 22	Mar 31	1, 3	2	
S. TRIB TO DASHWA LAKE	48° 56' 55"/ 91° 42' 00"	3	5	Oct 22	Oct 31	4		
			5	Oct 22	Oct 31	4		

a) 1. Research
2. Maintenance
3. New facility

b) 1. Ecological
2. Social
3. Aesthetic
4. No impact

c) 1. Design change
2. Location change
3. Schedule change
4. Other (specify)

Signature of RCM _____

Date _____

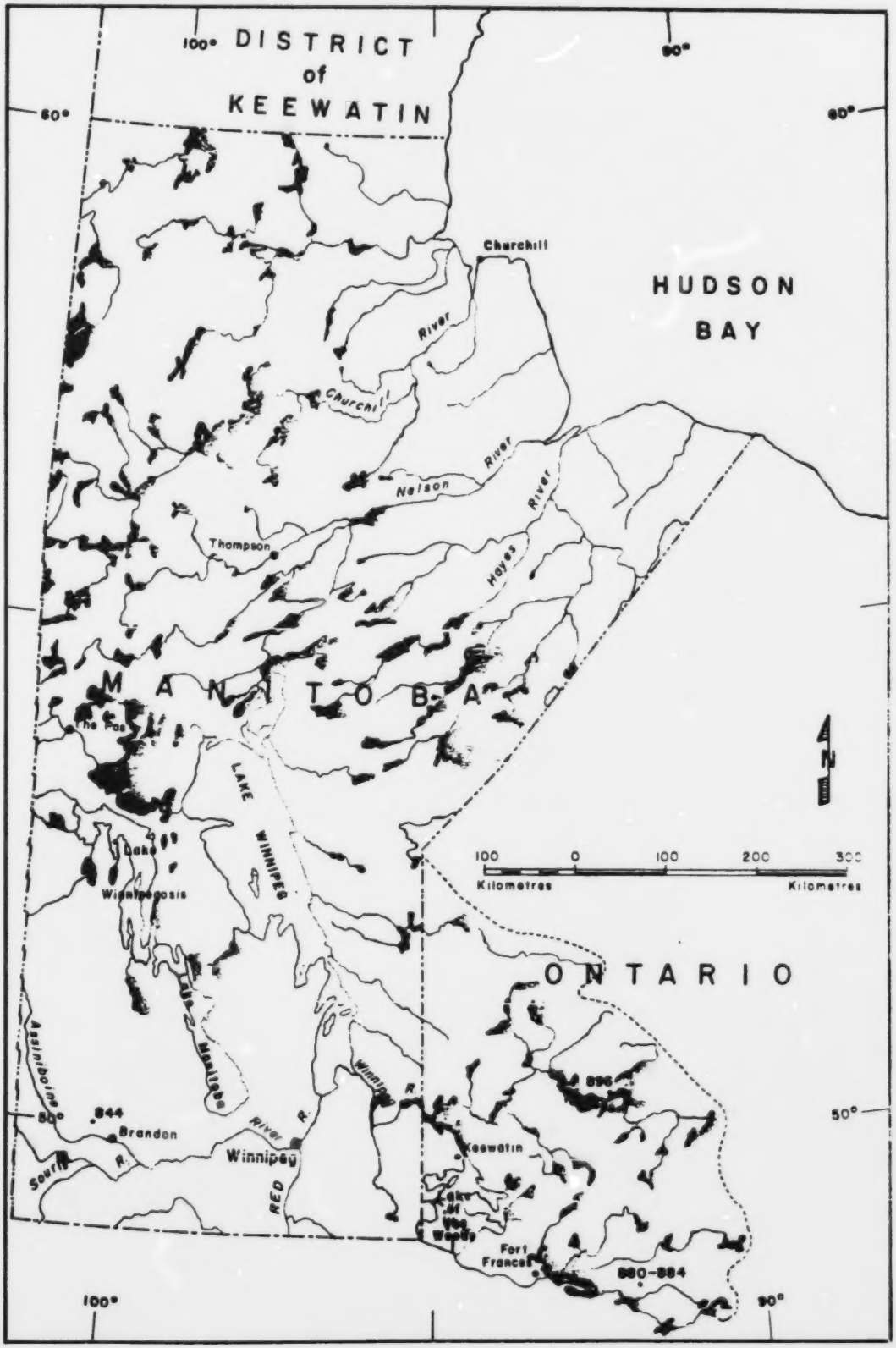
4.0 PROJECT DESCRIPTION AND COSTS

The following sections contain brief descriptions of the completed projects and associated cost data.

The three sections contained herein are Construction, Upgradng and Maintenance. The definition of these are given on Page 1 in the introduction. Definitions for breakdown of cost data is given on Page 10.

The costs do not include any instrumentation. Instrumentation costs and the installation of real-time telemetry equipment is covered in Section 5.

NEW CONSTRUCTION



NEW CONSTRUCTION

Project No. 844

Oak River near Rivers - Federal-Provincial 05MG004

Re-activate gauging station.

Description:	Existing 4' diameter x 8' deep 16 gauge galvanized gauge well, backfilled with gravel last year, was reactivated. A 5'-4" square Armco shelter with R8 fibreglass insulation and 1/4" hardboard panelling was installed on well. A 60 amp electrical service is provided.	
Construction:	Installation by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 50.27
	Travel Expenses	392.00
	Salaries	1,496.00
	Contract	200.00
	Total Project Cost	$2,138.27
Note (i)	Armco shelter reused from Oak River near Bradwardine (05MG010).	

Project No. 880

Eye River Basin Reconnaissance

Reconnaissance of gauging sites for AECL.

Reconnaissance: Visit five existing gauging sites and two potential new sites and recommend possible relocation, strucural changes or potential sites for construction of channel controls. Sites visited were:

(i) HS1 through HS5 (5 locations)
(ii) Two tributaries to N.E. section of Dashwa Lake

Cost Data

Travel Expenses	$ 753.63
Salaries	1,686.83
Total Project Cost	$2,440.46

Eye River near Bending Lake Road near Atikokan (HS4) - Federal 05PB022

Install gauge shelter for A.E.C.L.

Description: A 5'-4" x 8'-0" high colony green Armco prefabricated metal building, with window, was insulated with R8 fibreglass and panelled with 1/4" hardboard. Building sits on 3' high reinforced concrete base for protection from vehicular traffic and is lined with 12 gauge corrugated metal for protection from fire arms. Shelter contains two recorder shelves. A cross section was surveyed for potential concrete control.

Construction: Installtion by District personnel.

Construction Cost Data:

Materials and Supplies	$2,757.40
Travel expenses	709.89
Labour	319.27
Contracts	365.00
Salaries	3,200.00
Total Project Cost	$7,351.56

Eye River upstream of Bending Lake Road near Atikokan (HS5) - Federal 05PB021

Install gauge shelter, control structure and walkway footing for A.E.C.L.

Description:

Shelter: A 5'-4" x 8'-0" x 8'-0" high colony green Armco prefabricated metal building, with window, was insulated with R8 fibreglass and panelled with 1/4" hardboard. Building sets on 30" high reinforced concretebase for protection from vehicular traffic and is lined with 12 gauge corrugated metal for protection from firearms. Shelter contains two recorder shelves.

Control: A 40' wide, reinforced concrete and 8 gauge corrugated steel sheet pile control was constructed in overflow channel, east of main channel. (Drawing HS5-1).

Walkway: 2 - 2' x 4' reinforced concrete footings, 18" and 60" high were constructed to support a 36' span metering bridge. Area around footing on left bank was backfilled to confine channel flow (Drawing HS5-3).

Construction: Installation by District personnel.

Construction Cost Data:

Materials and supplies	$8,510.20
Travel Expenses	1,527.25
Labour	581.77
Contracts	2,131.00
Salaries	5,904.00
Total Project Cost	$18,654.22

Project No. 883

Dashwa Lake - Upper Northeast Tributary near Atikokan - Federal 05PB019

Preparation for installation of gauge well and control for A.E.C.L.

Description:	All materials for construction of small concrete control and functional gauge well were transported to site.	
Construction:	Preparation by District Personnel	
Construction Cost Data:	Materials and Supplies	$ 531.95
	Travel Expenses	487.08
	Labour	105.00
	Rentals	103.75
	Salaries	1,065.00
	Total Project Cost	$2,292.78

Project No. 884

Dashwa Lake - Lower North East Tributary near ATikokan - Federal 05PB020

Preparation for installation of gauge well and control for A.E.C.L.

Description:	All materials for construction of small concrete control and funtional gauge well were transported to sites.	
Construction:	Preparation by District Personnel.	
Construction Cost Data:	Materials and Supplies	$ 534.40
	Travel Expenses	326.13
	Labour	115.50
	Rentals	103.75
	Salaries	1,065.00
	Total Project Cost	$2,144.78

Lac Seul at Lac Seul - Federal 05QB001

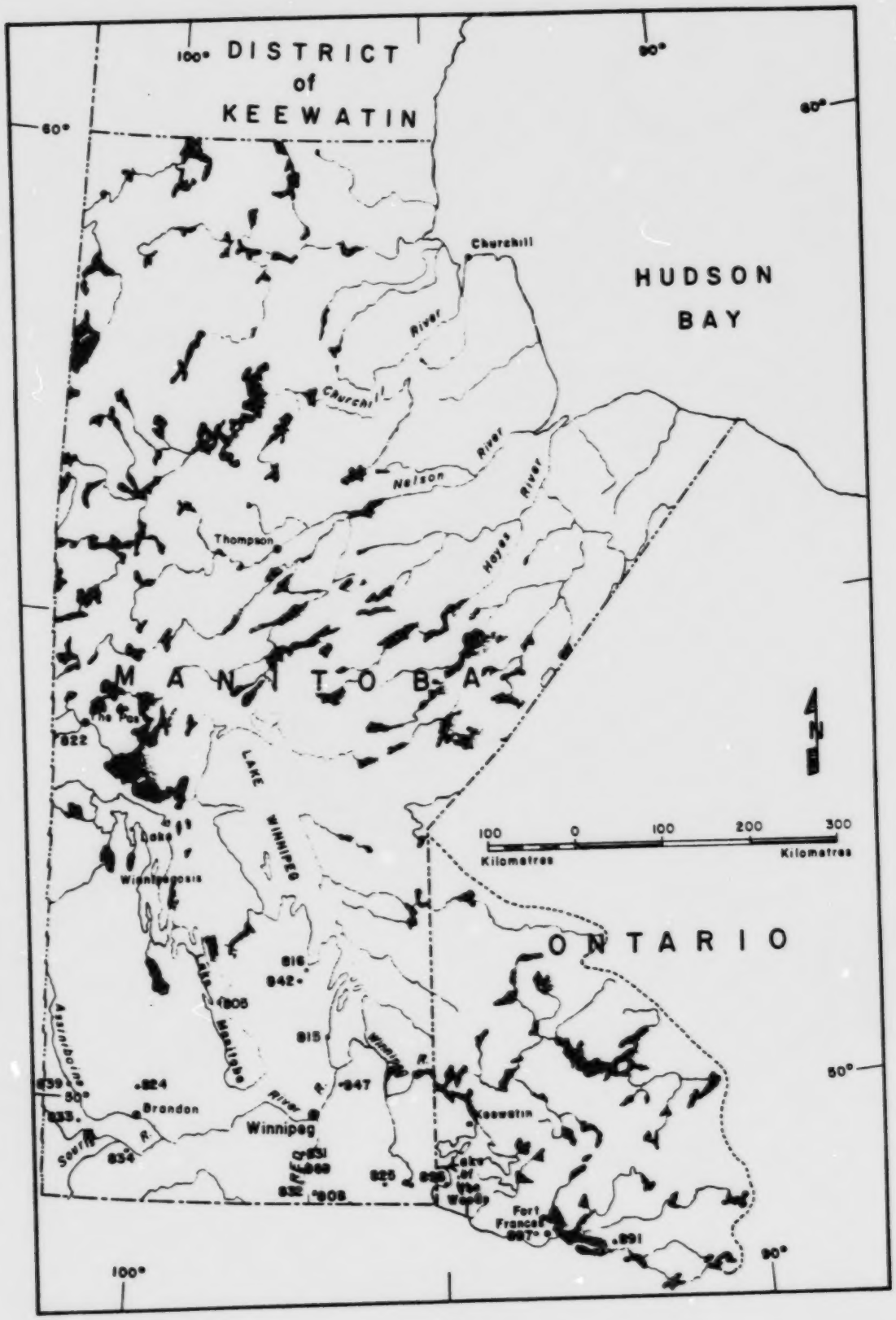
Install gauge shelter.

Description:	Shelter: A 5'-4" square by 8' high Armco prefabricated metal building with R8 fibreglass insulation and 1/4" hardboard panelling mounted on a timber base supported by four 6" x 6" timer posts set into ground.
Construction:	Installation by District personnel on property of Anglican Diocese of Keewatin.

Construction Cost Data:		
	Materials and Supplies	$ 400.04
	Travel Expenses	820.81
	Aircraft Charter	648.00
	Salaries	3,870.00
	Total Project Cost	$5,738.85

Note: (i) Shelter from Lac Seul at Hudson 05QB002 relocated to this site.

UPGRADING


DISTRICT
of
KEEWATIN
HUDSON
BAY
MANITOBA
ONTARIO
Churchill
Churchill River
Nelson River
Hayes River
Thompson
The Pas
Lake Winnipegosis
Lake Winnipeg
Lake Manitoba
Assiniboine River
Brandon
Winnipeg
Winnipeg R.
Souris R.
Keewatin
Lake of the Woods
Fort Frances
822
824
833
834
816
842
808
815
847
825
832
908
891
100°
90°
80°
60°
50°
100 0 100 200 300
Kilometres
Kilometres

UPGRADING

Project No. 805

Lake Manitoba at The Narrows - Federal - 05LK003

Insulate, panel, and hydro service to shelter.

Description:	Shelter insulated with R8 fibreglass insulation and panelled with 1/4" hardboard panelling. Shelter wired and 60 amp service provided to shelter.	
Construction:	Installation of insulation and panelling by District personnel. Shelter wired by West Lake Electric Ltd. of Eddystone, Manitoba.	
Construction Cost Data:	Materials and Supplies	$ 174.55
	Travel Expenses	120.50
	Hydro	1,114.00
	Electrical Contract	255.00
	Salaries	831.00
	Total Project Cost	$2,495.05

Project No. 808

Roseau River near Dominion City - Federal - 050D001

Telephone Service

Description:	Private line telephone service with series 500 telephone was installed.	
Construction:	Service by Manitoba Telephone System.	
Construction Cost Data:	Travel Expenses	$ 126.65
	Telephone	575.00
	Salaries	173.00
	Total Project Cost	$874.65

Project No. 815

Lake Winnipeg at Gimli - Federal 05SB006

Insulate gauge well and repair shelter.

Description:	Top 8' of existing 48" dia. x 12-1/2' deep C.S.P. gauge well was insulated with 1-1/2" x 12" white styrofoam panels attached on the inside of the well. The roof panels of the 5' x 8' x 8' high Armco shelter were covered with 3/4" plywood. The shelter door and base were painted.	
Construction:	Repair and insulation by District personnel..	
Construction Cost Data:	Materials and Supplies	$ 70.29
	Travel Expenses	263.39
	Salaries	438.00
	Total Project Cost	$771.68

Project No. 816

Fisher River near Dallas - Federal - 05SD003

Insulate shelter and repair platform.

Description:	5'-4" square Armco metal building insulated with R8 fibreglass insulation and panelled with 1/4" hardboard. Existing platform to cableway was moved back 5 feet towards A-frame using two of the concrete footings that had existed and pouring two 8" x 30" concrete footings. 3/4" safety loop was installed on A-frame.	
Construction:	Repairs and insulation by District personnel on private property.	
Construction Cost Data:	Materials and Supplies	$ 173.93
	Travel Expenses	330.50
	Salaries	672.00
	Total Project Cost	$1,176.43

Project No. 818

Assiniboine River at Holland - Federal - 05MH005

Insulate and panel gauge shelter; repair cable car platform.

Description:	The 4' x 6' x 3' high cablecar platform legs were cemented in concrete footings. The left bank A-frame was levelled for plumbness and shelter door and corners painted. The shelter was insulated with R20 fibreglass insulation and covered with 1/4" hardboard panelling. The floor was framed with a 2" x 4" frame and insulated with 1 1/2" hard styrofoam insulation and covered with 1/2" plywood.	
Construction:	Repairs, insulation and panelling was installed by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 385.63
	Travel Expenses	333.12
	Labour	20.00
	Salaries	1,096.00
	Total Project Cost	$1,834.75

Project No. 822

Carrot River near Turnberry - Federal 05KH007

Insulate and panel gauge shelter

Description:	Existing 5'-4" square by 8'-0" high Armco metal building insulated with R8 fibreglass and panelled with 1/4" hardboard panelling.	
Construction:	Installation by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 92.00
	Travel Expenses	244.10
	Salaries	282.00
	Total Project Cost	$618.10

Project No. 824

Little Saskatchewan River near Minnedosa - Federal 05MF001

Insulate shelter.

Description:	Existing 5'4" diameter by 7' high CSP culvert shelter was insulated with 1-1/2" white styrofoam.	
Construction:	Installation by District Personnel.	
Construction Cost Data:	Materials and Supplies	$ 16.75
	Travel Expenses	61.68
	Salaries	203.00
	Total Project Cost	$ 281.43

Project No. 825

Rat River near Sundown - Federal 050E004

Insulate shelter.

Description:	Existing 5'4" diameter by 7' high CSP culvert shelter was insulated with 1-1/2" white styrofoam.	
Construction:	Installation by District personnel on Department of Highways right of way.	
Construction Cost Data:	Materials and Supplies	$ 32.30
	Travel Expenses	90.75
	Salaries	127.00
	Total Project Cost	$ 250.05

Project No. 831

Morris River near Rosenort - Federal - Provincial - 050P020

Install electrical services.

Description:	30 amp hydro service extended to functional gauge well located on traffic bridge.	
Construction:	Installation by District personnel on Department of Highway's right of way.	
Construction Cost Data:	Materials and Supplies	$ 387.87
	Travel Expenses	265.11
	Hydro	1,477.00
	Salaries	1,070.00
	Total Project Cost	$3,199.98

Project No. 832

Plum River near Rosenfeld - Federal - Provincial - 050C019

Install electrical services.

Description:	30 amp hydro service extended to functional gauge well located on traffic bridge.	
Construction:	Electrical service installed by Bryan Friesen Electric and District personnel on Department of Highways right of way..	
Construction Cost Data:	Materials and Supplies	$ 145.19
	Travel Expenses	85.65
	Hydro	1,292.00
	Electrical contract	187.50
	Salaries	912.00
	Total Project Cost	$2,622.34

Project No. 833

Gopher Creek near Virden - Federal - Provincial - 05MG003

Install electrical services.

Description:	30 amp hydro service extended to functional gauge well attached to bridge wingwall.	
Construction:	Installation by District personnel and Cameron Electric of Virden, Manitoba..	
Construction Cost Data:	Materials and Supplies	$ 80.00
	Travel Expenses	366.80
	Electrical Contracts	603.71
	Hydro	1,044.00
	Salaries	913.00
	Total Project Cost	$3,007.50

Project No. 834

Elgin Creek near Souris - Federal - Provincial - 05NG012

Install electrical services.

Description:	30 amp hyro service extended to functional gauge well located on bridge.	
Construction:	Installation by District personnel and S & H Electric on Municipal right of way..	
Construction Cost Data:	Materials and Supplies	$ 166.92
	Travel Expenses	47.75
	Hydro	898.00
	Electrical	317.00
	Salaries	604.00
	Total Project Cost	$2,033.67

Assiniboine River near Miniota - Federal - Provincial - 05ME006

Cableway installation.

Description:

Left Bank: A 17' high 4" diameter galvanized steel pipe A-frame with aircraft marker supports set on 16" diameter x 30" deep reinforced concrete pedestals. A 5' x 6.5' x 4.5' deep reinforced concrete block, with 1-1/4" diameter anchor bar, poured for an anchor. A 4' x 6' x 6' high platform of 2-1/2 x 2-1/2 x 3/16" angle iron and armco grating was installed.

Right Bank: A 16' high 4" diameter galvanized steel pipe A-frame with aircraft marker supports set on 16" diameter x 30" deep reinforced concrete pedestals. A 5' x 6.5' x 4.5' deep reinforced concrete block with 1-1/4 diameter anchor bar, poured for an anchor, 5/8" anchor bars were used for aircraft marker cable and back stay lines on both anchors.

Cableway: A 201' span of 3/4" diameter 6 x 19 galvanized fibrecore grade 110/120 improved plough wire rope anchored to the concrete anchor blocks. 1-1/2 x 24 galvanized jaw and eye turnbuckle. An aluminum sit down cablecar installed (drawing No. 201.216).

Construction: Cableway installed by District personnel on property of the Municipality of Miniota..

Construction Cost Data:

Materials and Supplies	$6,169.80
Travel Expenses	1,349.73
Contracts	210.00
Salaries	3,977.00
Total Project Cost	$11,706.53

Project No. 842

East Fisher River near Hodgson - Federal - Provincial - 05SD004

Install electrical services.

Description:	30 amp hydro service extended to functional gauge well located on traffic bridge.	
Construction:	Electrical service installed by J. Abas Electric and District personnel on Department of Highways right of way..	
Construction Cost Data:	Materials and Supplies	$ 282.25
	Travel Expenses	105.94
	Hydro	262.00
	Electrical	332.00
	Salaries	567.00
	Total Project Cost	$1,549.19

Project No. 847

Devils Creek near Libau - Federal - Provincial - 050J016

Remove functional installation and install C.S.P. shelter.

Description:	54" diameter C.S.P. shelter installed on wooden base along dike. 60 feet of 1" polypipe installed to water's edge from building as orifice carrier line in trench 1 foot deep.	
	18" diameter - 12' long culvert and "California" shelter removed from centre pier of bridge.	
Construction:	Work by District personnel on Provincial property.	
Construction Cost Data:	Materials and Supplies	$1,168.00
	Travel Expenses	13.70
	Salaries	450.00
	Total Project Cost	$1,631.70

Note: (i) Salvaged Materials - 18" diameter culvert 12' long
- "california" shelter

Project No. 869

Shannon Creek near Morris - Provincial 05OF014

Install electrical services.

Description:	30 amp hydro service installed and extended to existing functional gauge well located on bridge.	
Construction:	Electrical service installed by District personnel, Manitoba Hydro, and Bryan Freisen..	
Construction Cost Data:	Materials and Supplies	$ 231.13
	Travel Expenses	163.43
	Hydro	973.00
	Electrical Contract	187.50
	Salaries	468.00
	Total Project Cost	$2,371.06

Project No. 891

Pipestone River above Rainy Lake - Federal - 05PB015

Insulate and panel gauge shelter.

Description:		
Shelter -	Existing 5'04" square x 8' high Armco metal building insulated with R8 fiberglass and panelled with 1/4" hardboard.	
Construction:	Installation by District personnel on Crown land..	
Construction Cost Data:	Materials and Supplies	$ 186.56
	Travel Expenses	256.15
	Rental	150.00
	Salaries	660.00
	Total Project Cost	$1,252.71

Project No. 895

Lake of the Woods at Cyclone Island - Federal - 05PD029

Gauge shelter installation.

Description:

Shelter - A 5'-10" square by 7-6" high "Bally" prefabricated building with 4" urethane insulated walls, ceiling and floor with galvanized metal interior, mounted on a 6' x 6' base anchored to bedrock.

Construction: Installation by District personnel on Canada Customs property..

Construction Cost Data:		
	Materials and Supplies	$2,924.62
	Travel Expenses	432.46
	Aircraft charter	354.50
	Salaries	635.00
	Total Project Cost	$4,346.58

Project No. 897

LaValley River near Devlin - Federal - 05PC016

Insulate shelter, electrical, heat tape.

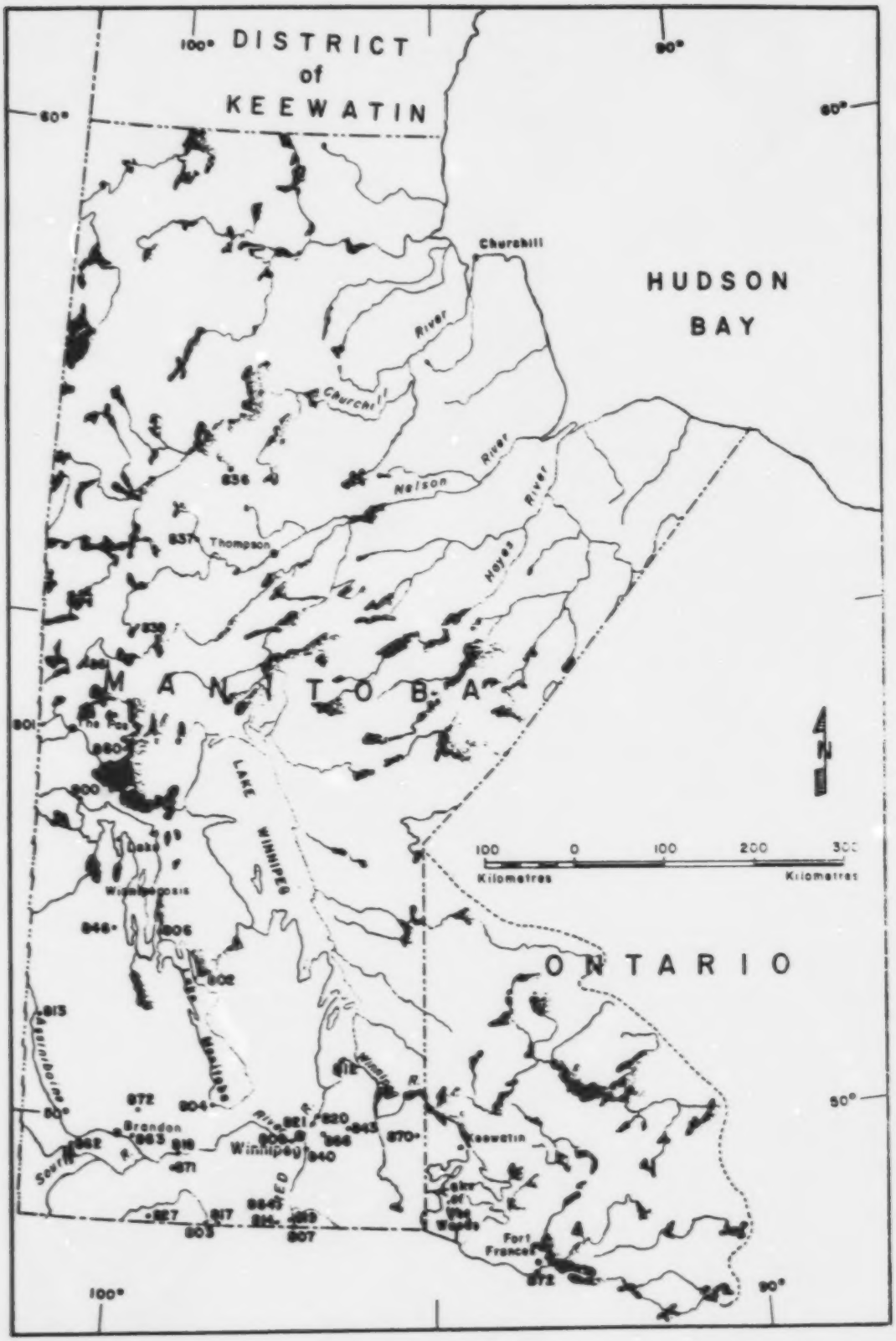
Description:

Shelter - The existing Armco shelter was insulated with R8 fibreglass and panelled with 1/4" hardboard. 60 amp electrical service was installed in shelter. Pyrotenax heat tape D/R 1952/30/407/110/18/14/y was installed in lower intake pipe.

Construction: By District personnel on private property..

Construction Cost Data:		
	Materials and Supplies	$ 723.08
	Travel Expenses	202.70
	Salaries	960.00
	Total Project Cost	$1,885.78

MAINTENANCE



MAINTENANCE

Project No. 800

Overflowing River near Overflowing - Federal - 05LD001

Remove shelter, walkway and stilling well.

Description:	A 54" diameter C.S.P. shelter was removed from stilling well. A 36' x 3' wide steel walkway and 48" diameter x 12' long C.S.P. well were also removed.	
Construction:	Removal by District personnel..	
Construction Cost Data:	Travel Expenses	$ 410.56
	Contracts	180.00
	Salaries	774.00
	Total Project Cost	$1,364.56

Note: (i) Salvaged material - 54" diameter C.S.P. shelter
- 48" diameter by 12' long stilling well

Project No. 801

Saskatchewan River near Manitoba Boundary - Federal - 05KH008

Dismantle Armco shelter and storage shed.

Description:	Existing 5'-4" square by 8'-0" high Armco shelter and 8' by 10' by 8' high metal storage shed were dismantled and removed from gauging station.	
Construction:	Dismantled by District personnel.	
Construction Cost Data:	Travel Expenses	$ 245.49
	Aircraft Charter	228.00
	Salaries	362.00
	Total Project Cost	$ 835.49

Note: (i) Salvaged material - 5'-4" square Armco building.

Project No. 802

Lake Manitoba at Steeprock - Federal - 05LK002

Repair shelter and install conduit for M.T.S. service.

Description: Installed 150 feet of 3/4" E.M.T. along top of dock from power pole to gauge shelter for Manitoba Telephone system line.

Installed 1/2" plywood on top of existing metal ribbed roof to avoid further damager by divers. Flashing installed on outside edge of building at roof line.

Construction: Repairs and installation by District personnel on Crown property..

Construction Cost Data:		
	Materials and Supplies	$ 153.73
	Travel Expenses	63.86
	Salaries	300.00
	Total Project Cost	$ 517.59

Project No. 803

Snowflake Creek near Snowflake - Federal - 050B016

Rip rap around gauge well and improve cableway section.

Description: 24 yards of earth fill was placed around existing gauge well. 18 yards of 4"-8" stones were placed on top of the fill for protection against erosion. Stones were removed from the creek channel at the cableway section. Minor repairs were performed on the cableway.

Construction: Work completed by District personnel on private property..

Construction Cost Data:		
	Materials and Supplies	$ 36.36
	Travel Expenses	385.42
	Salaries	665.00
	Contracts	668.00
	Total Project Cost	$1,754.78

Project No. 804

Lake Manitoba at Westbourne - Federal - 05LL012

Repair and level building

Description:	5/8" spruce siding placed over existing 5 x 7 Kemso building. A new slope roof was constructed over existing flat roof using 1/2" plywood cover and asphalt roll roofing. Building was levelled and anchored in place.	
Construction:	By District personnel on Manitoba Parks Land.	
Construction Cost Data:	Materials and Supplies	$ 281.87
	Travel Expenses	394.64
	Salaries	708.00
	Total Project Cost	$1,384.51

Project No. 806

Waterhen River near Waterhen - Federal - 05LH005

Replace aircraft markers.

Description:	Existing damaged aircraft marker bells were replaced with new markers, and hangers. Back stay lines replaced with 1/2" 6x 19 galvanized wire rope.	
Construction:	Installation by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 400.50
	Travel Expenses	401.03
	Salaries	780.00
	Total Project Cost	$1,581.53

Project No. 807

Red River at Emerson - Federal - 050C001

Remove cableway and install ladder cage.

Description:	Dismantled 400' span cableway. A-frames were removed. A 21' high ladder cage was constructed surrounding the vertical ladder attached to the exterior of the concrete gauge well.	
Construction:	Work completed by District personnel on Municipal property.	
Construction Cost Data:	Materials and Supplies	$ 515.43
	Travel Expenses	411.25
	Salaries	1,214.00
	Total Project Cost	$2,140.68

Project No. 809

Assiniboine River at Headingley - Federal - 05MJ001

Reconstruct cableway platform and install brackets on gauge well ladder.

Description:	Wooden 10' x 12' x 6' - 6" high timber cableway platform was removed from site and replaced with a galvanized steel platform 10' x 8-1/2' x 6' - 6" high. 7 support posts 2 1/2 x 2-1/2 x 1/8" having a 2-1/2 x 2-1/2 x 1/8" galvanized L iron frame and decked with 2" x 9" Armco metal grating. Platform access is a galvanized steel stair having its base cemented into a concrete pad. The stairs have a 42" high handrail on both sides 3 pairs of ladder brackets were installed in concrete stilling well.	
Construction:	Reconstruction by District personnel on private property.	
Construction Cost Data:	Materials and Supplies	$1,820.44
	Travel Expenses	212.01
	Salaries	1,217.00
	Total Project Cost	$3,249.45

Project No. 812

Lake Winnipeg at Victoria Beach - Federal - 05SA003

Replace electrical service.

Description:	Increased existing service to 120/240V, single phase 50 amp service to gauge shelter. Gauge shelter was rewired with 5 outlets and related wiring.	
Construction:	Installation by District personnel and D.M.D. Electrical of Traverse Bay, Manitoba.	
Construction Cost Data:	Materials and Supplies	$ 213.67
	Travel Expenses	165.36
	Electrical	678.00
	Salaries	728.00
	Total Project Cost	$1,785.03

Project No. 813

Shell River near Inglis - Federal - 05MD005

Install Pyrotenax heat tape and intake pipe flushing system.

Description:	Heat tape D/R2452/18/152/110/12/14/y installed in lower intake pipe 2' Riser pipes with valves were installed for flushing system.	
Construction:	Installation by District personnel on private property.	
Construction Cost Data:	Materials and Supplies	$ 423.63
	Travel Expenses	226.95
	Salaries	543.00
	Total Project Cost	$1,193.58

Project No. 814

Buffalo Lake Channel near Altona - Federal 050C025

Removal of gauge well and temporary removal of existing shelter.

Description: Existing 10' long, 15" diameter steel pipe gauge well and steel plate shelter were removed from bridge wing wall.

Existing Armco shelter was moved temporarily to accommodate approach road work to newly constructed concrete culverts installed by the municipality. Shelter was relocated once roadwork was complete. 30 amp service to shelter was re-installed.

Construction: Removal and relocation was completed by District personnel.

Construction Cost Data:		
	Materials and Supplies	$ 26.62
	Travel Expenses	217.77
	Salaries	623.00
	Total Project Cost	$ 867.39

Note: (i) Salvaged materials - 10' by 15" diameter culvert
- steel plate recorder shelter

Project No. 817

Mowbray Creek near Mowbray - Federal - 050B021

Rip-rap control.

Description: Existing 68' long sheet steel weir was rip-rapped with 6" to 10" stone.

Construction: Rip-rapping by Bells Plumbing and Heating of Morden, Manitoba, on property of Allan Blair of Maida North Dakota. Rip rap supplied by G. Kissick of Miami, Manitoba..

Construction Cost Data:		
	Materials and Supplies	$ 29.38
	Travel Expenses	309.38
	Salaries	678.00
	Contracts	360.00
	Total Project Cost	$1,377.21

Project No. 819

Riviere aux Marais near Chirsite - Federal - 050C022

Bury electrical cable.

Description:	Existing 80' long overhead electrical line removed and buried underground from 6 x 6" timber service pole to "california" shelter on bridge.	
Construction:	Installation by District personnel on municipal right of way.	
Construction Cost Data:	Materials and Supplies	$ 1.50
	Travel Expenses	83.05
	Salaries	385.00
	Total Project Cost	$ 469.55

Project No. 820

Red River near Lockport - Federal 050J010

Tighten Aircraft marker cable.

Description:	1/2" diameter 6 x 19 wire rope aircraft marker cable was lowered and retightened. Existing turnbuckle was extended to accomodate future adjusting.	
Construction:	By District Personnel on private property.	
Construction Cost Data:	Travel Expenses	$ 58.52
	Salaries	180.00
	Total Project Cost	$238.52

Project No. 821

Red River at St. Andrews Lock - Federal

Dismantle the existing gauge shelter.

Description:	Existing 5'-4" by 8'-0" by 8'-0" high Armco shelter was dismantled and removed from gauging site.	
Construction:	Dismantled by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 10.60
	Travel Expenses	97.58
	Salaries	247.00
	Total Project Cost	$ 355.18

Note: (i) Salvaged materials - 5'-4" x 8'0 x 8'0 high green Armco building

Project No. 823

Seine River Diversion near St.Adolphe - Federal

Dismantle gauge shelter and remove well.

Description:	Existing 5'-4" by 8' x 8' high Armco metal shelter was dismantled and removed from site. Existing 48" diameter 13 ft. corrugated steel pipe culvert well and intakes were removed from site. A 48" by 4' sediment stilling well was also removed along with buried 6" C.S.P. line.	
Construction:	By District personnel on Municipal property.	
Construction Cost Data:	Materials and Supplies	$ 43.33
	Travel Expenses	197.94
	Salaries	881.00
	Contracts	450.00
	Total Project Cost	$1,572.27

Note: (1) Salvaged Materials - 5'-4" x 8'-0 x 8'0 high Armco Building
- 48" diameter x 13' Stilling well

Project No. 827

Long River near Holmfield - Federal - 050B006

Replace instrument shelter.

Description:	Replace wooden california shelter with steel plate instrument shelter.	
Construction:	Repaired by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 131.36
	Travel Expenses	217.50
	Salaries	360.00
	Total Project Cost	$ 708.86

Project No. 836

Churchill River Diversion at South Bay - Federal - Provincial - 06EC002

Dismantle gauge shelter.

Description:	A 5'-10" square x 7'-6" high "Bally" prefabricated building and base was dismantled and removed from site.	
Construction:	Dismantled by District personnel on crown land..	
Construction Cost Data:	Travel Expenses	$ 103.18
	Salaries	420.00
	Total Project Cost	$ 523.18

Note: (i) Salvaged Material - 5'-10" square x 7' high "Bally" building.

Project No. 837

Rat River below Notigi Control - Federal Provincial - 06EC002

Dismantle gauge shelter.

Description:	A 5'-10" square x 7'-6" high "Bally prefabricated building and base was dismantled and removed from site.	
Construction:	Dismantled by District personnel on Crown land.	
Construction Cost Data:	Materials and Supplies	$ 23.31
	Travel Expenses	137.08
	Salaries	660.00
	Total Project Cost	$ 820.39

Note: (i) Salvaged Material - 5'-10" square x 7' high Bally building.

Project No. 838

Wekusko Lake at Berry Bay Wharf - Federal - Provincial 05TB003

Dismantle Armco shelter.

Description:	Existing 5'-4" square by 8' high Armco shelter was dismantled and removed from gauging site.	
Construction:	Dismantled by District personnel.	
Construction Cost Data:	Travel Expenses	$413.18
	Salaries	403.00
	Total Project Cost	$ 816.18

Note: (i) Salvaged material - 5'-4" square green Armco building.

Project No. 840

Red River below Floodway Control Structure - Federal-Provincial - 050C020

Telephone Service.

Description:	Private line underground telephone service was installed to replace existing temporary overhead service.	
Construction:	Service by Manitoba Telephone System.	
Construction Cost Data:	Telephone	$1,000.00
	Travel Expenses	62.45
	Salaries	300.00
	Total Project Cost	$1,362.45

Project No. 843

Brokenhead River near Beausejour - Federal - Provincial - 05SA002

Level shelter.

Description:	Existing 5'-4" square Armco shelter levelled on well. Well brackets removed and reinstalled at proper heights.	
Construction:	By District personnel on private property..	
Construction Cost Data:	Materials and Supplies	$ 15.00
	Travel Expenses	143.72
	Salaries	300.00
	Total Project Cost	$ 458.72

Project No. 846

Garland River near Duck River - Federal - Provincial - 05LG006

Install gauge well and shelter.

Description:	18" diameter, galvanized corrugated steel pipe 14' long attached to bridge pier with 2 sets 2 x 2 x 3/16" angle iron straps. A standard "California" shelter houses a float-activated recorder. "California" shelter replaced by steel shelter that was destroyed by vandals.	
Construction:	Installation by District personnel on P.T.H. #489 bridge.	
Construction Cost Data:	Materials and Supplies	$ 283.75
	Travel Expenses	266.77
	Salaries	639.00
	Total Project Cost	$1,189.52

Note: (i) 18" diameter culvert and "california" shelter re-used from Vermillion River at Dauphin. (05LJ046).

Project No. 860

South Moose Lake at Moose Lake - Provincial 05KK001

Dismantle Kemso shelter.

Description:	Existing 5' x 7' x 6'-6" high metal clad Kemso building was dismantled and removed from gauging site.	
Construction:	Dismantled by District personnel.	
Construction Cost Data:	Travel Expenses	$ 359.05
	Salaries	360.00
	Rentals	251.16
	Total Project Cost	$ 970.21

Project No. 861

Simonhouse Lake near Cranberry Portage - Provincial 05TA002

Dismantle Armco shelter.

Description:	Existing 5'-4" square by 8'-0" high Armco shelter was dismantled and removed from gauging site.	
Construction:	Dismanted by District personnel.	
Construction Cost Data:	Travel Expenses	$310.60
	Salaries	362.00
	Total Project Cost	$672.60

Note: (i) Salvaged material - 5'-4" square green Armco building.

Project No. 862

Oak Lake at Oak Lake Resort - Provincial 05NG008

Dismantle abandoned shelter.

Description:	Existing 5'-4" square by 8'-0 high Armco shelter was dismantled and removed from gauging site (unsalvagable).	
Construction:	Dismantled by District personnel.	
Construction Cost Data:	Travel Expenses	$179.48
	Salaries	355.00
	Total Project Cost	$534.45

Project No. 863

Willow Creek near Chater - Provincial -5MH011

Repair well straps.

Description:	Replaced supports between well and bridge pier which had worked loose. Straps were then tightened and well levelled.	
Construction:	Repairs by District personnel on Dept. of Highways right of way..	
Construction Cost Data:	Materials and Supplies	$ 7.62
	Travel Expenses	21.50
	Salaries	318.00
	Total Project Cost	$ 347.12

Project No. 864

Hespeler floodway near Rosenfeld - Provincial 050C016

Repair shelter and install gaurd posts.

Description:	Corner panels of Armco shelter were replaced. Damage was due to vandalism. Guard posts composed of 6" dia. x 6' long C.S.P. culverts filled with concrete and extending 3' above ground, were installed. The posts were joined by 2" x 2" x 8" angle iron railing surrounding the building.	
Construction:	Work completed by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 317.68
	Travel Expenses	191.59
	Salaries	812.00
	Total Project Cost	$1,321.27

Project No. 866

Cooks Creek at Cooks Creek - Provincial - 050J006

Install well straps.

Description:	2 x 6 supports installed from wooden centre pier to the existing 18" diameter culvert and stapped in place with well strips - supports installed 5 feet and 8' above bottom of well.	
Construction:	Installation by District personnel on Municipal property.	
Construction Cost Data:	Materials and Supplies	$ 67.23
	Travel Expenses	88.16
	Salaries	240.00
	Total Project Cost	$ 395.39

Project No. 870

Whiteshell River at Outlet - Jessica Lake - Provincial - 05PA001

Replace steel walkway

Description:	8' long x 27-1/4" wide, 2 x 2 x 3/16" galvanized steel frame with 2" x 9" Armco steel planking. Walkway attached to sides of 24" well and anchored by flags set into bedrock on shore.	
Construction:	Installation by District personnel.	
Construction Cost Data:	Materials and Supplies	$157.48
	Travel Expenses	82.94
	Salaries	420.00
	Total Project Cost	$660.42

Project No. 871

Oxtail Creek near Cypress River - Provincial - 05MH012

Replace instrument shelter.

Description:	Replace vandalized wooden California shelter with steel plate instrument shelter.	
Construction:	Repairs by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 125.00
	Travel Expenses	68.95
	Salaries	214.00
	Total Project Cost	$ 407.95

Project No. 872

Whitemud River near Neepawa - Provincial 05LL011

Temporary removal of recorder installation.

Description:	Recorder shelter and upper section of stilling well were removed and reinstalled to facilitate repairs to bridge deck and guard rails.	
Construction:	Removal and re-installation by District personnel.	
Construction Cost Data:	Travel Expenses	$113.15
	Salaries	428.00
	Total Project Cost	$541.15

Project No. 873

La Salle River near Elie - Provioncial 050G008

Repair gauge well

Description:	Existing gauge well and shelter were straigtened and refastened to bridge. Damage was caused by vandals.	
Construction:	Repairs by district personnel.	
Construction Cost Data:	Materials and Supplies	$ 2.50
	Travel Expenses	23.00
	Salaries	120.00
	Total Project Cost	$ 145.50

Project No. 899

Lake of the Woods at Keewatin - Federal 05PE014

Prepare for Removal of gauging installation.

Description:	Instrumentation removed Hydro and Telephone facilities removed and support cables attached for removal of gauge shelter and well to allow for wharf repairs.	
Construction:	Preparation by District personnel.	
Construction Cost Data:	Materials and Supplies	$ 20.31
	Travel Expenses	96.83
	Salaries	285.00
	Total Project Cost	$402.14

4.4 PROJECT COST SUMMARY

MANITOBA

Federal Stations

Material and Supplies	$5,033.87
Travel Expsnses	5,669.45
Salaries	14,467.00
Aircraft	228.00
Labour	20.00
Electrical	933.00
Hydro	1,114.00
Contracts	1,658.00
Telephone	575.00
Total Federal Cost	$29,698.32

Federal-Provincial Stations

Materials and Supplies	$8,772.36
Travel expenses	3,753.06
Salaries	12,711.00
Hydro	4,973.00
Electrical	1,440.21
M.T.S.	1,000.00
Contracts	410.00
Total Federal-Provincial Cost	$33,059.63

Provincial Stations

Materials and Supplies	$908.64
Travel Expenses	1,601.82
Salaries	4,445.00
Rentals	251.16
Hydro	973.00
Electrical	187.50
Total Provincial Cost	$8,367.12

TOTAL MANITOBA	$71,125.07

ONTARIO

Federal Stations

Materials and Supplies	$4,254.61
Travel Expenses	1,808.95
Salaries	6,410.00
Rentals	150.00
Aircraft Charter	1,002.50
Total Federal Cost	$13,626.06

Atomic Energy of Canada

Materials and Supplies	$12,333.95
Travel Expenses	3,803.98
Salaries	12,920.83
Labour	1,121.54
Rentals	207.50
Contracts	2,496.00
Total A.E.C.L. Cost	32,883.80
TOTAL ONTARIO	$46,509.86
TOTAL CONSTRUCTION	$117,634.93

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5.0 INSTALLATION OF INSTRUMENTATION AND REAL TIME TELEMETRY EQUIPMENT

In addition to the work carried out by the Construction Section of the Water Resources Branch, capital projects are also carried out by the Water Survey of Canada Division. these include the purchase, installation and maintenance of the equipment in the gauging shelters. Unless otherwise noted these projects are carried out by the hydrometric technicians during the course of operating the hydrometric gauging station network using Federal funds.

During 1984/85 sixteen DCP systems, sixteen servomanometers, two Telemarks, 4 additional Memomark III's and 1 Hydromark were installed.

MANITOBA

05RD007 Berens River at outlet of Long Lake
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Delco 1120 12 volt Battery
CAE Model 311M servomanometer
Federal-Provincial Cost-Share- Federal
Cost including installation cost - $12,400

05RD008 Pigeon River at Outlet of Round Lake
Bristol Hyromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Delco 1120 12 Volt Battery
CAE Model 311M Servomanometer
Federal - Provincial Cost-share - Federal
Cost including installation - $12,500

05RE001 Poplar River at outlet of Weaver Lake
Bristol Hyromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Delco 1120 12 Volt Battery
CAE Model 311M Servomanometer
Federal - Provincial Cost-share - Federal
Cost including installation - $12,800

05KH007 Carrot River near Turnberry
Bristol Hyromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Varta 24RV400 12 Volt Battery
CAE Model 311M Servomanometer
Federal Cost including installation - $12,000

06DA002 Cochrane River near Brochet
Bristol Hyromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Torqueflite 12 Volt Battery
CAE Model 311M Servomanometer
Federal-Provincial Cost-share- Federal cost including installation cost - $13,100

06DR001 Reindeer Lake at Brochet
Bristol Hyromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Torqueflite 12 Volt Battery
CAE Model 311M Servomanometer
Federal-Provincial Cost-share- Federal cost including installation cost - $12,900

06FD001 Churchill River above Red Head Rapids
Bristol Hyromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Varta 24RV400 12 volt Battery
Federal-Provincial Cost-share - Federal cost including installation cost - $9,100

06FB002 Little Beaver near the Mouth
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solarex SX-10 Solar Panel
Varta 24RV400 12 volt Battery
CAE Model 311M Servomanometer
Federal - Provincial Cost-share - Federal cost including installation cost - $12,900

05UF004 Kettle River near Gillam
Leupold-Stevens T4 Telemark (from stock)
CAE Model 311M Servomanometer
Federal - Provincial Cost-share - federal cost including installation cost - $4,200

05NF016 Souris River near Coulter
Bristol Model - Old Style (from stock)
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Varta 24RV400 12 Volt Battery
Federal - provincial Cost-share Federal cost including installation cost - $2,000

05KL005 Cedar Lake near Oleson Point
Memomark III and interface cabling installed
Federal cost $2,200

05TB002 Cross River at Wekusko Falls
Memomark III and interface cabling installed
Federal cost - $2,200

05SG001 Lake Winnipeg at Mission Point
Memomark III and interface cabling installed
Federal Cost - $2,200

05mH013 Assiniboine River near Brandon
Memomark III and interface cabling installed
Federal cost - $2,200

05OJ016 Devils Creek near Libau
Servomanometer
Federal - provincial cost shared each party's cost - $1,950

ONTARIO

05QE012 Long-Legged River below Long-Legged Lake
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Varta 24RV400 12 Volt Battery
CAE Model 311M servomanometer
Federal program Federal cost including installation cost - $12,800

05PR021 Eye River Upstream of Bending Lake Road near Atikokan
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Solorex 220 HP solar Panel
Varta 24RV400 12 Volt Battery
CAE Model 311M Servomanometer
Funded by AECL, cost including installation - $12,400

05RPR022 Eye River near Bending Lake Road near Atikokan
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Varta 24RV400 12 Volt Battery
CAE model 311M servomanometer
Funded by AECL, cost including installation - $12,400

05QR001 Lac Seul at Lac seul
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Solorex 220 HP solar Panel
Varta 24RV400 12 Volt Battery
CAE Model 311M Servomanometer
Tipping Bucket Rain Gauge
Funded by LWCB Cost including installation - $11,900

05QE008 Cedar River below Wabaskang Lake
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Varta 24RV400 12 volt Battery
CAE Model 311M Servomanometer
Tipping Bucket Rain Gauge
Funded by LWCB Cost including installation - $11,500

05RC001 Berens River above Berens Lake
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Varta 24RV400 12 volt Battery
CAE Model 311M Servomanometer
Federal program Cost including installation $12,500

05PD029 Lake of the Woods at Cyclone Island
Bristol Hydromet GOES DCP
Stevens Memomark III
Synergetics Directional Antenna
Solorex SX-10 Solar Panel
Solorex 220 HP Solar Panel
Varta 24RV400 12 volt battery
CAE Model 311M Servomanometer
Tipping Bucket Rain Gauge
Funded by LWCB, Cost including installation - $12,100

05PB007 Rainy Lake near Fort Frances
Leupold and Stevens Hydromark
Funded by WRB, HQ, cost - $4,100

05PC001 Pinewood River near Pinewood
Leupold and Stevens T4 Telemark (from stock of LWCB)
Cost including installation $150

5.1 SUMMARY OF INSTRUMENTATION AND TELEMETRY COSTS

Manitoba

Federal

8 Water Level Recorders	$17,600.00
8 Servomanometers	31,200.00
8 DCP Systems including installation	70,400.00
5 Memomark III's and interfacing cables	10,800.00

Federal - Provincial

1 Servomanometer	3,900.00
TOTAL MANITOBA	$133,900.00

ONTARIO

Federal

2 Water level Recorders	$ 4,400.00
2 DCP Systems including installation	17,500.00
2 Servomanometers	7,800.00
1 Hydromark	4,100.00

Other Agency

A. LWCBS

3 Water Level Recorders	6,600.00
3 Servomanometers	11,700.00
3 DCP Systems including installation	22,300.00
Total LWCB	$40,600.00

B. AECL

2 Water Level Recorders	4,400.00
2 Servomanometers	7,800.00
2 DCP Systems including installation	17,000.00
Total AECL	$29,200.00
TOTAL ONTARIO	$103,600.00
DISTRICT TOTAL	$237,500.00

APPENDIX A

CONSTRUCTION METHODS AND PROCEDURES

BANK INSTALLATIONS

In-bank installations are handled by private contractor on tender, or by District staff. Generally those requiring a well depth greater than 16 feet are handled by contractor, who will supply all materials (except Armco building) and all labour. Construction staff is on site to assure intake pipes and back fill are properly installed.

If construction is done by own staff, then the 16 gauge, 48" diameter galvanized corrugate metal pipe, complete with riser pipes and flush valves, is purchased on tender from private supplier. Backhoe and operators are hired by service contract to perform necessary excavation. When excavation is complete, stilling well is installed and a well tieback system is attached. The lower intake pipe and heating cables are installed at this time. Back fill and compaction proceed until elevations of other intake pipes are reached and installed. When back fill is complete, the building support system and floor are fastened to the well.

The 5'-4" x 5'-4" x 8'-0" high Colony Green Armco metal shelter is then erected and insulated on site. Insulation generally consists of R-8 fibreglass batts covered with 1/4" hardboard panelling.

If hyro is readily available, then service contracts are issued for extension of 110/220 single phase 60 amp service to gauge shelter.

PRESSURE INSTALLATIONS

The foundation or support system for this type of structure is either 6" thick reinforced concrete floor set on concrete piles or a timber base set on 4 - 6" timbers set 30" into the ground. The Armco or Bally building is then erected on site. Armco buildings are then insulated and panelled.

The pressure line is installed under ground through the floor of shelter to an orifice blcok installed in the river. This line is either threaded through a flexible metal conduit or 2" plastic pipe buried in ground to prevent vandalism.

FUNCTIONAL INSTALLATION

Generally consists of 15" diameter, 16 gauge, galvanized, corrugated metal pipe attached to a wing wall, pile or pier or a bridge.

The stilling well can either be a plain piece of culvert, have a 1/8" plate welded over bottom end, have 1 1/2" intake pipes, have a clean out door, or a combination of all of the above, depending upon stream characteristics.

These structures are usually installed by dumping culvert on stream bed or ice, jockeying one end of well into approximate position at stream bed and raising the other end to its position at bridge deck by using a

come-a-long. The well is then plumbed and fastened in place by straps and threaded rod or by stud bolts and angle iron on concrete structures.

A 24 x 30" "California" steel plate shelter is then attached to upper end of culvert to house A35 recorder.

CABLEWAYS

A-frames, fabricated to standard plans, have legs of 4" diameter galvanized steel pipe in sizes 6 to 16 feet with support arms for aircraft warning marker cables.

Wide flange section 6" x 6" galvanized steel with hinged base have been used for cableways higher than 16 feet.

Supports for short cableways may be of 8" x 8" wide flange galvanized steel sections, free standing, set in 2 foot diameter concrete base in depths at least equal to the above ground height of cable support. The main cable is then tensioned by 20 inch long threaded U-bolts at each cableway support.

i) Cables

Main cable is 3/4" to 1", 6 x 19 wire rope, galvanized fibrecore improved plough steel or 1-1/8", 1 x 19 trainway track strand with spelter sockets. Tie backs and aircraft warning marker cable are 3/8" or 1/2", 6 x 19 wire rope, galvanized mild plough steel.

ii) Anchorages

Steel reinforced concrete deadman 6-1/2' x 5' x 4=1/2' deep with 1-1/4" diameter, galvanized steel main anchor bar and 5/8" diameter galvanized steel tiebacks and erection bars.

Where bedrock exists, one inch diameter rock pins are grouted into holes drilled in the bedrock. Two rock pins and axle for the main cable and one rock pin for the back stay.

iii) Pedestals

Steel reinforced concrete is poured into sonotube forms 18" in diameter by 4' deep. Pedestal bolts anchor the A-frame to the pedestals.

iv) Turnbuckles

Drop-forged galvanized 1-1/2" x 24" turnbuckles are used to attach and regulate the sag of the main cable to the anchorage. Crosby clips and thimbles are the standard accessories.

v) Aircraft Warning Markers

Fibreglass bells 30" diameter by 30" deep, international orange are standard.

vi) Cable-car Platforms

2-1/2" x 2-1/2" x 1/4" angle iron, bolted to A-frame and fitted with Armco Interlocking Grating for deck and dexion safety railing.

viii) Detached Platform

Legs are three inch diameter galvanized pipe with 2-1/2" x 2-1/2" x 1/4" galvanized angle iron frame, mounted on concrete pedestals. Armco Grating deck, safety railing and metal access ladder are part of standard design.

ix) Electrical

Walk in gauge shelters are wired for 60 amp electrical service. This includes 3 duplex receptacles, each on separate circuits and one overhead light on a switch. Heat tapes are wired directly into thermostats or toggle switches.

Functional gauge structures are supplied with 30 amp service. One duplex receptacle is used on two circuits. A 6 x 6 service pole with service panel and mast is located on high ground near gauge.

APPENDIX B

SALVAGED MATERIALS

This section is a listing of all salvaged materials from Federal, Federal-Provincial and Provincially funded stations. The list is cumulative from year to year with reused materials dropped from list in subsequent years. CWRB has stored and labelled all salvaged materials.

Footnotes at appropriate projects are included in the projects description, describing material salvaged or reused for that particular project.

Materials salvaged from a station of one category (P) and reused at a station of another category (F-P) are identified by a footnote to the list.

SALVAGED MATERIALS

Material	Source			Re-Use	
	Station No.	Year Const'd.	Category At Const'n	Station No.	Category
1983-84					
18" dia. x 14' culvert	050G021	1971	F		
18" dia. x 18' culvert	050D027	1971	F		
21" dia. x 13' culvert	05LJ031	1973	F		
21" dia. x 16' culvert	050A014	1972	F		
"California" shelter"	05LJ031	1973	F		
"California" shelter"	050A014	1972	F		
Steel Plate shelter	050G021	1971	F		
5'-4" Armco Bldg. (ins)	05MG010	1967	F	05MG004	F-P
5'-4" Armco Bldg.	05MG004	1967	F		
5'-4" Armco Bldg.	05QB002	1968	F	05QB001	F
48" dia. x 14' stilling well	05MG010	1967	F		
15" dia. x 14' culvert	05LL008	1978	F-P		
18" dia. x 12' culvert	05LJ015	1977	F-P		
18" dia. x 5' culvert	05NG009	1979	F-P		
18" dia. x 12' culvert	05LJ046	1977	F-P		
18" dia. x 10' culvert	05LJ046	1977	F-P		
"California" shelter	05LL008	1978	F-P		
"California" shelter	05LJ015	1977	F-P		
"California" shelter	05NG009	1979	F-P		
"Calfironia" shelter	05LJ046	1977	F-P		
1984-85					
15" dia. x 10' culvert	050C025	1980	F		
18" dia. x 12' culvert	050J016	1971	F		
"California" shelter	050J016	1971	F		
Steel Plate Shelter	050C025	1980	F	05MH012	P
48" dia. x 12" stilling well	05LD001	1970	F		
54" dia. CSP shelter	05LD001	1970	F		
5'-4" ARmco Bldg.	05KH008	unknown	F		
5'-4" x 8'-0" Armco Bldg	-	1971	F	05PB022	F
5'-4" x 8'-0" Armco Bldg	050E013	1971	F	05PB021	F
5'-10" Bally Bldg.	06RC002	1977	F		
5'-10" Bally Bldg.	05TF003	1977	F		
5'-4" Armco Bldg.	05TB003	1979	F-P		
5'-4" ARmco Bldg.	05TA002	1981	P		
400'-1" dia. wire rope	050C001	1967	F		